

Highly Adaptive Primary Mirror Having Embedded Actuators, Sensors, and Neural Control, Phase I

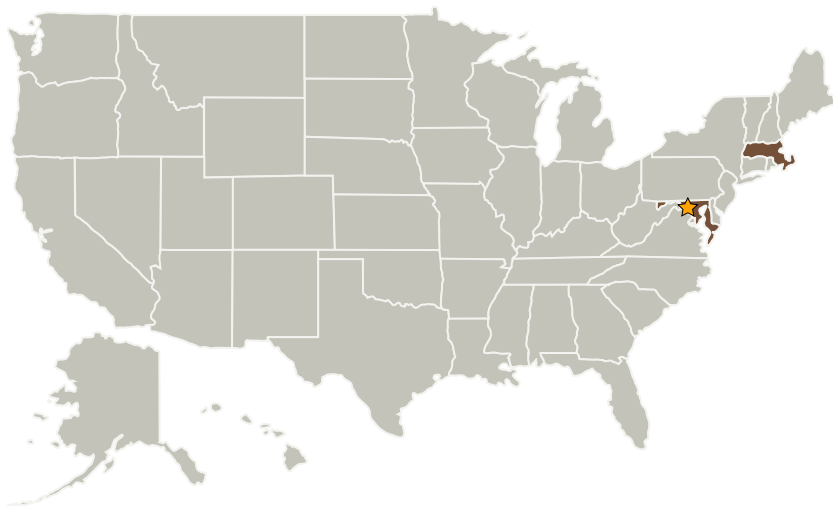
Completed Technology Project (2004 - 2004)



Project Introduction

The NASA Space Science Enterprise is studying various future missions to explore the Evolution of the Universe (SEU). For example, normal incidence telescopes with a primary optic of 40 m are being studied for deployment beyond geo-synchronous orbits (e.g. L2) and requiring operation to 4K. These missions will require optics of unprecedented optical tolerances to achieve scientific success and extremely low weight in order to be deployed. The optics will most certainly be adaptive in order to obtain initial optical figure and eliminate aberrations due to thermal or other environmentally induced drift. New actuation and control technology will be required to obtain areal densities well below that of 15kg/m² currently being considered for the Webb Telescope. Light weight CERAFORM silicon carbide based optics with embedded actuation and sensing is the approach taken in this proposal for making a large primary segmented mirror. In addition, by using local mirror sensing and neural control technology, the computational complexity associated with an extremely high actuation count in a large optic system can be greatly reduced. These two technologies currently being developed with Xinetics will be integrated to demonstrate the feasibility of this approach to meet NASA goals.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Xinetics, Inc.	Supporting Organization	Industry	Devens, Massachusetts

Primary U.S. Work Locations	
Maryland	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Dave Pearson

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.2 Observatories
 - └ TX08.2.1 Mirror Systems